XX. *Account of the* Free Martin.

By Mr. John Hunter, *F. R. S.*

Read February 25, 1779.

GENERATION, when produced from a ſeed, has two cauſes which concur towards its perfection; the one which forms the ſeed, the other which gives it the principle of action [a].

The cauſe which forms the ſeed is called the female, the other cauſe is called the male; but thoſe two cauſes in general make only a part of a whole animal, or are

(a) It may be neceſſary for ſome of my readers to have explained to them what I mean by a ſeed. I do ſuppoſe, that the word ſeed was firſt applied to grain, or that which is always called ſeed in the vegetable; which ſeed is the part of that claſs of vegetables in which the matter of the young vegetable exiſts, or is formed. The principle of arrangement fitting the parts for action in this claſs of ſeed being at firſt not known, a falſe analogy between the vegetable and animal was eſtabliſhed, *viz.* the ſecretion of the *teſtes* (the only known principle in the animal) was called the ſeed: but from the knowledge of the diſtinct ſexes in the vegetable it is well known, that the ſeed is the female production in them, and that the principle of arrangement for action is from the male. The ſame operation and principles take place in many orders of animals, *viz.* the female produces a ſeed, in which is the matter fitted for the firſt arrangement of the organs of the animal, and which receives the principle of arrangement fitting them for action from the male.

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rather parts ſuperadded to an animal. Probably they were firſt conſidered in thoſe animals where thoſe parts were ſeparated, or in which the female parts were wholly found in one animal and the male in the other; therefore the terms female and male have been applied to the whole animal, dividing them into two diſtinct ſexes, and the parts which formed either the one ſex or the other called either the female or the male parts of generation; but upon a further knowledge of animals, and of thoſe parts, they were found to be united in the ſame animal in many of the inferior tribes, who, from poſſeſſing both parts, have got the name of hermaphrodite.

As both thoſe parts are natural to moſt animals, and as the union of them in the ſame animal is alſo natural to many, and the ſeparation of them in diſtinct animals, is only a circumſtance making no eſſential difference in the parts themſelves; it becomes no great effort or uncommon play in nature to unite them in thoſe animals in which they are commonly ſeparated.

And accordingly we find many of thoſe orders of animals, which have them ſeparate naturally, have them ſometimes united.

From this account hermaphrodites may be divided into two kinds; the natural, and the unnatural uncommon or monſtrous.

The natural belongs to the inferior and more ſimple order of animals, of which there are a much greater number than of the more perfect; but as animals become more complicated, have more parts, and each part is more confined to its particular uſe, a ſeparation of the two neceſſary powers for generation have alſo taken place in them.

The unnatural, I believe, now and then takes place in every tribe of animals having diſtinct ſexes, but is more common in ſome than in others [(b)]. I fancy the human has the feweſt, never having ſeen them in that ſpecies nor in dogs: cats we know leſs of; but in the horſe, aſs, ſheep, and cattle, they are very frequent.

Though this ſpecies of hermaphrodite be a mixture of both ſexes, and ſo poſſeſſes the parts peculiar to each in perfection, there is yet one part of each which it does not poſſeſs: I mean the part which is common to both. For as this common part is different in one ſex from what it is in the other, and it is impoſſible for one animal to have both kinds; that which they do have muſt of courſe partake of both ſexes, and conſequently render the hermaphrodite imperfect *quoad hoc*.

(b) *Quere*, Is there ever in the tribe of animals, that are natural hermaphrodites, a ſeparation of the two parts?

This one or common part is the *clytoris* in the female, and *penis* in the male; and the great difference in this part between the one ſex and the other is ſize and perforation for the *ſemen*.

But thoſe parts, which are peculiar to each ſex, may be all perfectly joined in the ſame animal, which would come up to the idea of the trueſt hermaphrodite.

The hermaphrodites of this kind, which I have ſeen, have always appeared externally, and, at firſt view, to be females: and in thoſe ſpecies of animals where only the female is preſerved for breeding, as in ſheep, goats, pigs, &c. they are generally ſaved as females.

In the horſe they are very frequent: I have ſeen ſeveral, but never diſſected any. The moſt perfect I have ſeen in this ſpecies were thoſe in which the teſticles had come down out of the *abdomen* into the place where the udder ſhould have been (*viz.* more forward than the *ſcrotum*) and appeared like an udder, not ſo pendulous as what the *ſcrotum* is in the true male of ſuch animals. There were alſo two nipples, which horſes have no perfect form of, being blended in them with the ſheath or *prepuce*, of which there was none here.

The external female parts were exactly ſimilar to thoſe of the perfect female; and, inſtead of a common-

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ſized *clytoris*, there was one about five or ſix inches long, which, when erect, ſtood almoſt directly backwards.

I procured a foal aſs, very ſimilar in external appearance to the above horſe, and killed it, to examine the parts. It had two nipples, but the teſticles were not come down as in the above; owing, perhaps, to the animal's being yet too young.

There was no *penis* paſſing round the *pubis* to the belly as in the perfect male aſs.

The external female parts were ſimilar to thoſe of the ſhe-aſs. Within the entrance of the *vagina* was placed the *clytoris*, but much longer than that of a true female, being about five inches long. The *vagina* was open a little further than the opening of the *urethra* into it, and then became obliterated; from thence up to the *fundus* of the *uterus* there was no canal.

At the *fundus* of the common *uterus* it was hollow, or had a cavity in it, and then divided into two, *viz.* a right and a left, called the horns of the *uterus*, which were alſo pervious.

Beyond the termination of the two horns were placed the *ovaria* as in the true female, but I could not find the *fallopian* tubes.

From the broad ligaments to the edges of which the horns of the *uterus* and the *ovaria* were attached, there

paſſed towards each groin a part ſimilar to the round ligaments in the female, which were continued into the rings of the *abdominal* muſcles; but with this difference, that there were continued with them a *proceſs* or *theca* of the *peritoneum*, ſimilar to the *tunica vaginalis communis* in the male aſs, and in theſe *thecæ* were found the teſticles: but I could not obſerve any *vaſa deferentia* paſſing from them.

Here then we found in the ſame animal the parts peculiar to each ſex (although very imperfect), and that part which is common to both (but different in each) was a kind of medium of that difference.

Something ſimilar to the above I have ſeen in ſheep, goats, &c.; but I ſhall not at preſent trouble the Society with a deſcription of hermaphrodites in general, as it is a very extenſive ſubject, admitting of great variety, which would make it appear a production of chance, whereas the intention of this paper is to ſhow a circumſtance which takes place in the production of hermaphrodites in cattle, and which appearing to be an eſtabliſhed principle in the œconomy of propagation of that ſpecies of animal, and not a production of chance, is, perhaps, peculiar to them, and, probably, the only way in which they are ever produced in this ſpecies.

It is a known fact, and, I believe, is underſtood to be univerſal, that when a cow brings forth two calves, and that one of them is a bull-calf, and the other a cow to appearance, the cow-calf is unfit for propagation; but the bull-calf becomes a very proper bull. They are known not to breed: they do not even ſhew the leaſt inclination for the bull, nor does the bull ever take the leaſt notice of them [c].

This cow-calf is called in this country a *free martin*; and this ſingularity is juſt as well known among the farmers as either cow or bull.

This calf has all the external marks of a cow-calf ſimilar to what was mentioned in the unnatural hermaphrodite, *viz.* the teats and the external female parts, called by farmers the bearing.

When they are preſerved it is not for propagation, but for all the purpoſes of an ox or ſpayed heifer, *viz.* to yoke with the oxen, and to fatten for the table [d].

They reſemble in form thoſe imperfect animals very much, *viz.* they are much larger than either the bull or the cow, and the horns grow larger, being very ſimilar to the horns of an ox.

(c) I need hardly obſerve here, that if a cow has twins, and that they are both bull-calves, that they are in every reſpect perfect bulls; or if they are both cow-calves, that they are perfect cows.

(d) *Vide* LESLIE on Huſbandry, p. 98, 99.

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The bellow of the free martin is ſimilar to that of an ox, which is not at all like that of a bull; it is more of the cow, although not exactly that.

The meat is alſo ſimilar to that of the ox or ſpayed heifer, *viz.* much finer in the fibre than either the bull or cow; and they are more ſuſceptible of growing fat with good food. By ſome they are ſuppoſed to exceed the ox and heifer in delicacy of food, and bear a higher price at market.

However, it ſeems that this is not univerſal; for I was lately informed by CHARLES PALMER, eſq. of Luckley in Berkſhire, that there was a free martin killed in his neighbourhood, and, from the general idea of its being better meat than common, every neighbour beſpoke a piece, which turned out nearly as bad as bull beef, at leaſt worſe than that of a cow. It is probable, that this might ariſe from this one having more the properties of the bull than the cow, as we ſhall ſee hereafter that they are ſometimes more the one than the other [e].

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(e) The Romans called the bull *taurus:* they, however, talked of *tauræ* in the feminine gender. And STEPHENS obſerves, that it was thought the Romans meant by *tauræ*, barren cows, and called them by this name becauſe they did not conceive any more than bulls. He alſo quotes a paſſage from COLUMELLA, lib. vi. cap. 22. "and like the *tauræ*, which occupy the place of

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Free martins are ſaid to be in ſheep[f]; but from the accounts given of them, I ſhould very much ſuſpect that theſe are hermaphrodites produced in the common way, and not like thoſe of cattle. They are often imperfect males, ſeveral of which I have ſeen. They are mentioned as both male and female, which is not reconcileable to the account given of the free martin.

I believe it has never been even ſuppoſed what this animal is, with all thoſe peculiarities.

From the ſingularity of the animal, and the account of its production, I was almoſt ready to ſuppoſe the account a vulgar error; yet from the univerſality of its teſtimony it appeared to have ſome foundation; and therefore I made all the inquiry I could for an opportunity of ſeeing one, and alſo to examine it. Since which time I have accordingly had an opportunity of ſeeing three; the firſt of which was one belonging to JOHN ARBUTHNOT, eſq. of Mitcham, which was calved in his own farm. He was ſo obliging as to give me an opportunity of ſatisfying myſelf. He allowed me, firſt, to have a drawing made of the animal while alive, which was exe-

" fertile cows, ſhould be rejected, or ſent away." He likewiſe quotes VARRO, *De re Ruſtica*, lib. ii. cap. 5. " The cow which is barren, is called *taura*." From which we may reaſonably conjecture, that the Romans had not the idea of the circumſtances of their production.

(f) LESLIE's Huſbandry, p. 156.

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cuted by Mr. GILPIN. When the drawing was made of Mr. ARBUTHNOT's free martin, JOHN WELLS, eſq. of Bickley Farm, near Bromley in Kent, was preſent, and informed us, that a cow of his had calved two calves; and that one was a bull-calf, and the other a cow-calf. I deſired Mr. ARBUTHNOT to ſpeak to Mr. WELLS to keep them, or let me buy them of him; but, from his great deſire for natural knowledge, he very readily preſerved both, till the bull ſhewed all the ſigns of a good bull, when he ſold him.

From the diſſection of the three above mentioned free martins it plainly appeared, that they were all hermaphrodites differing from one another; as is alſo the caſe in hermaphrodites in other tribes.

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The Deſcription of the three Free Martins.

Mr. ARBUTHNOT'S Free Martin[g].

The external parts were rather ſmaller than in the cow. The *vagina* paſſed on, as in the cow, to the opening of the *urethra*, and then it began to contract into a ſmall canal, which paſſed on to the diviſion of the *uterus* into the two horns, each horn paſſed along the edge of the broad ligament laterally towards the *ovaria*.

At the termination of thoſe horns were placed both the *ovaria* and the teſticles; both were nearly of the ſame ſize, which was about as large as a ſmall nutmeg.

To the *ovaria* I could not find any *Fallopian* tube.

To the teſticles were *vaſa deferentia*, but they were imperfect. The left one did not come near the teſticle; the right only came cloſe to it, but did not terminate in a body called the *epididymis*. They were both pervious, and opened into the *vagina* near the opening of the *urethra*.

(g) This animal was about ſeven years old, had been often yoked with the oxen; at other times went with the cows and bull, but never ſhewed any deſires for either the one or the other.

On the poſterior ſurface of the bladder, or between the *uterus* and bladder, were the two bags, called *veſiculæ ſeminales* in the male, but much ſmaller than what they are in the bull: the ducts opened along with the *vaſa deferentia*. This was more deſerving the name of hermaphrodite than the two following; for it had a mixture of all the parts, although all were imperfect.

Mr. WRIGHT's Free Martin, *five years old.*

The *vagina* terminated in a blind end, a little way beyond the opening of the *urethra*, beyond which the *vagina* and *uterus* were impervious. The *uterus* at its extreme part divided into two horns. At the termination of the horns were placed the teſticles inſtead of the *ovaria*, as is the caſe in the female. The reaſons why I call thoſe bodies teſticles are the following. Firſt, they were more than twenty times larger than the *ovaria* of the cow, and nearly as large as the teſticles of the bull, particularly as thoſe of the ridgill, the bull whoſe teſticles never come down. Secondly the ſpermatic arteries were exactly ſimilar to thoſe of the bull, eſpecially of the ridgill. Thirdly, the *cremaſter* muſcle paſſed up from the

the rings of the abdominal muſcles to the teſticles, as it does in the ridgill [b].

There were the two bags placed behind the bladder, between it and the *uterus*. Their ducts opened into the *vagina*, a very little way beyond the opening of the *urethra*; but there was nothing ſimilar to the *vaſa deferentia*.

As the external parts had more of the cow than the bull, the *clytoris*, which may alſo be reckoned an external part, was alſo ſimilar to that of the cow; not at all in a middle ſtate between the *penis* of the bull and the *clytoris* of the cow, as I have deſcribed in the hermaphrodite horſe. There were four teats; the glandular part of the udder was but ſmall.

This animal cannot be ſaid to have been a mixture of all the parts of both ſexes, for the *clytoris* had nothing ſimilar to the *penis* in the male, and was different in the cow part, in having nothing ſimilar to the *ovaria*, nor was the *uterus* a cavity.

(b) Although I call theſe bodies teſticles for the reaſon given, yet they were only imitations of ſuch, for when cut into they had nothing of the ſtructure of the teſticle: not being ſimilar to any thing in nature, they had more the appearance of diſeaſe. From the ſeeming imperfection of the animal itſelf, it was not to be ſuppoſed that they ſhould be teſticles, for then the animal ſhould have partook of the bull, which it certainly did not.

Mr. WELLS'S Free Martin.

This animal was never ſeen to ſhew any ſigns of a deſire for the male, although it went conſtantly with one. It looked more like an heifer than what they commonly do; but as it was only between three and four years old when killed, it is verv probable, that it was not ſufficiently old to have taken the characters of the ox; however, this may be owing to another circumſtance that will be mentioned hereafter.

The teats and udder were ſmall compared with thoſe of a heifer, but rather larger than in either of the former; the beginning of the *vagina* ſimilar to that of the cow, but it ſoon became obliterated beyond the opening of the *urethra*, as in the laſt deſcribed. The *vagina* and *uterus* to external appearance was continued, although not pervious, and the uterine part divided into two horns, at the end of which were the *ovaria*.

I could not obſerve in this any other body which I might have ſuppoſed to be the teſticle.

There was on the ſide of the *uterus* an interrupted *vas deferens* broken off in ſeveral places.

Behind the bladder, or between it and the *vagina*, were the bags called *veſiculæ ſeminales*, between which were the terminations of the two *vaſa deferentia*.

The ducts of the bags and the *vaſa deferentia* opened as in the former.

This could not be called an exact mixture of all the parts of both ſexes, for here was no appearance of teſticles.

The female parts were imperfect, and there was the addition of part of the *vaſa deferentia*, and the bags called *veſiculæ ſeminales*.

This circumſtance of having no teſticles, perhaps, was the reaſon why it had more the external appearance of a heifer than what they commonly have, and more than either of the two former had.